

Use of a porous cellulose membrane (Membracel®) and moxibustion for severe excoriative injury in a chilean skua (*Catharacta chilensis*)

Utilização de membrana celular porosa (Membracel®) e moxabustão em lesão escoriativa severa em mandrião chileno (*Catharacta chilensis*)

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Abstract

The use of alternative therapeutic approaches in wild animals has gained notoriety due to its efficiency, low cost and reduced or nonexistent stressors. The present study evaluated the efficacy of treatment of a bilateral excoriative lesion in the region of the dorsal metacarpus in a Chilean skua (*Catharacta chilensis*) in a rehabilitation process with the use of a porous cell membrane, sold commercially, in concomitance with moxibustion sessions with herbs (*Artemisia vulgaris*). The healing time of 14 days was reduced when compared to traditional techniques and proved the viability and efficacy of the treatment.

Keywords: *Artemisia vulgaris*. Healing. Rehabilitation. Metacarpus. Marine bird.

Resumo

O uso de abordagens terapêuticas alternativas em animais selvagens tem ganhado notoriedade em virtude de sua eficiência, baixo custo e estímulos estressores reduzidos ou inexistentes. Este estudo avaliou a eficácia do tratamento de uma lesão escoriativa bilateral em região do dorsal metacarpo em um mandrião chileno (*Catharacta chilensis*) em processo de reabilitação com o uso de uma membrana celular porosa vendida comercialmente, em concomitância com sessões de moxabustão com ervas (*Artemisia vulgaris*). O tempo de cicatrização de catorze dias mostrou-se reduzido quando comparado ao de outras técnicas tradicionais e provou a viabilidade e eficácia do tratamento.

Palavras-chave: *Artemisia vulgaris*. Cicatrização. Reabilitação. Metacarpos. Ave marinha.

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Traditional techniques for treatment of skin lesions in birds have been widely applied in varied species. Most of them are directed to treat bacterial, viral, parasitic and fungal infections, which affect the skin of broiler and egg chickens (GREENE et al., 1985; MESSIER et al., 1993; FALLAVENA et al., 2000). The diagnosis and treatment of skin lesions in wild birds are less reported, although cases of bumble foot (BLAIR, 2013), cellulitis and dermatitis (bacterial or fungal) (KOSKI, 2002) and carcinomas (REAVILL, 2004) have been well shown (PALMEIRO; ROBERTS, 2013). In addition to conventional therapies, some alternative therapeutic techniques like homeopathy and acupuncture

have been successfully applied in both commercial and exotic birds (XIE; ECKERMANN-ROSS, 2012; PESCH, 2014; HUANG et al., 2016). The present study evaluated the use of two non-conventional techniques – cellulose membrane (Membracel®) and moxibustion therapy – during healing process of injured skin in the metacarpus region of a Chilean skua, considering its efficiency and time.

Situations that involve deep and extensive wounds in birds are challenging due to the small quantity of skin and associated blood vessels as well as the form of bandaging necessary for the promotion of adequate healing (RAJCHARD, 2010). Besides asepsis and conventional therapeutics with antibiotics and anti-inflammatories, some techniques have been developed to assist in the skin repair process, such as the use of skin flaps, autografts and extracellular matrix (BILLINGHAM; MEDAWAR, 1951; BARRANDON; GREEN, 1988). Currently, novel techniques are being applied, such as negative-pressure wound therapy in birds (KNAPP-HOCH; MATOS,

2014), acupuncture (BLAIR, 2013) and gelatin-keratin glue in humans (RAJA et al., 2013). Holistic methods have also been administered in the treatment of injuries not only in birds, but also small animals (PESCH, 2014) and zoo animals, such as acupuncture, moxibustion and acupressure, which are based on stimulating particular points situated at meridians that are able to achieve responses from organs and systems of the body, especially moxibustion, which increases healing with thermogenic effects (XIE; ECKERMANN-ROSS, 2012; HUANG et al., 2016).

The skua was brought to the rehabilitation center (Cananéia Research Institute, Brazil) on May 16, 2016 with a bilateral injury of the skin in the region of the metacarpus (Figure 1A). The bird was apathetic but had a good body condition. During the first week, the animal was stabilized with fluids, painkillers, proper ambient temperature and antibiotics to control the infection. The treatment involved fluid therapy q 4-6 h for 2 d (electrolytic – starting with 40 ml, increasing slowly each time until 60 ml), antibiotics (enrofloxacin 10 mg/kg and cefalexin 30 mg/kg) for 7 d

q 24 h, an anti-inflammatory (ketoprofen 1 mg/kg) for three days q 24 h, all orally. Analgesic therapy injection (metamizole 25 mg/kg) q 12 h for 3 d and the wound cleaned q 12 h (Riohex 2%, Rioquímica®). The bird was force-fed through an esophageal tube after the second day with fish paste containing vitamins and minerals (2 g of Aminomix®). Initially, feeding was with 40-60 ml q 6 h, increasing time to q 8-12 h until the animal started to self-feed. During this phase of captivity, the bird accidentally re-injured the wound of the right wing (on D 17) that was already in the process of healing (Figure 1B).

After re-injuring the tissue in the metacarpus region, the bird exhibited edema and necrotic scabs that were sensitive to the touch, so analgesics were administered again to contribute to the well-being of the bird. Also, the patient was kept in a heated enclosure (26 to 30 °C) for 7 d to prevent another event of self-harm. After that, the bird was transferred to an external enclosure with rocks and an area for bathing, disinfected daily with quaternary ammonium (2%), and the rocks were cleaned with a high-pressure washer (Wap®).

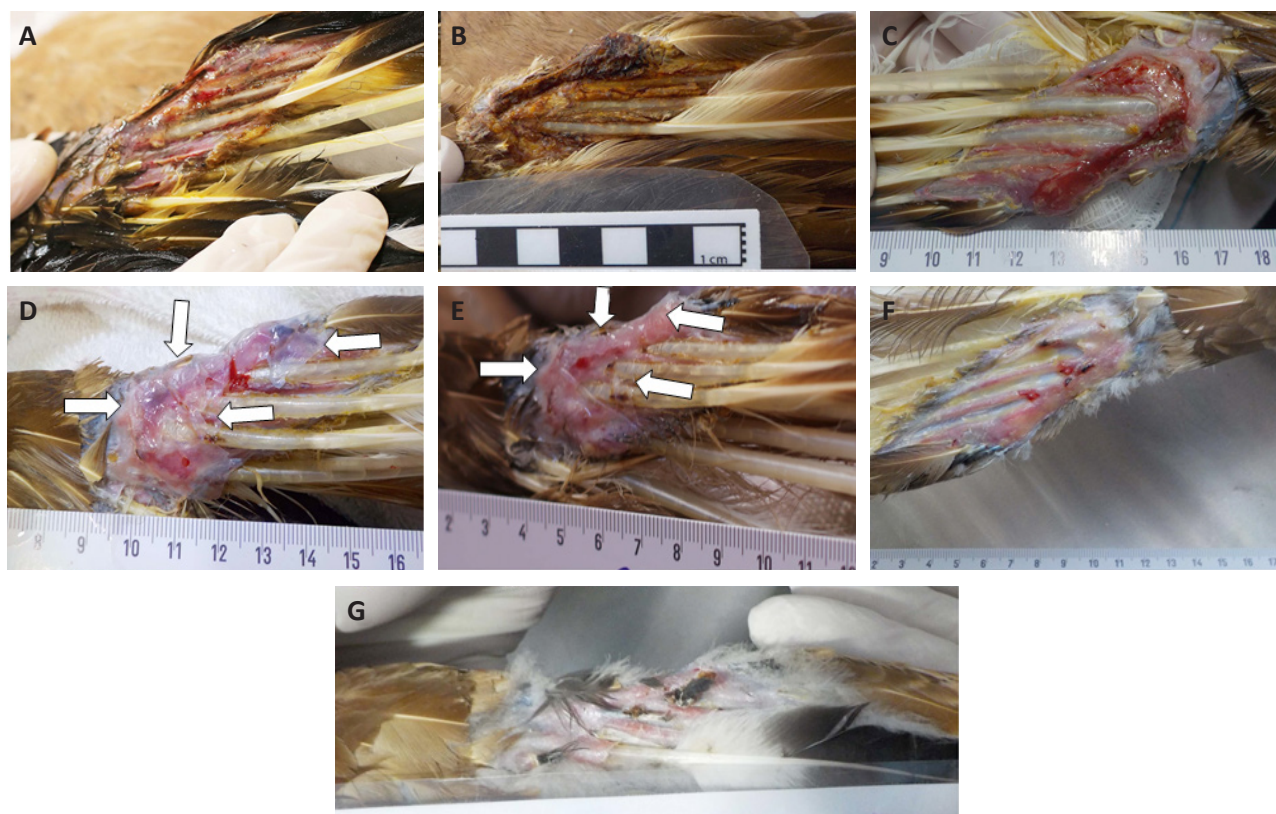


Figure 1 – 1A: Wound of the right wing upon admission of *Catharacta chilensis* to rehabilitation center exhibiting discreet necrotic edges, edema and bleeding, May 16, 2016; 1B: Wound after re-injury exhibiting greater area of necrosis, June 1, 2016; 1C: Cleaned wound with no necrotic material associated with slow healing. First time of membrane application, photo without the membrane June 6, 2016; 1D Second time of membrane application with membrane in the wound (white arrow), June 11, 2016; 1E: Advanced healing with abundant regeneration tissue upon third application of porous cellulose membrane (white arrow), June 17, 2016; 1F: Tissue after 3 d of the last membrane application, June 20, 2016; 1G: Completely repaired wound during week of release, July 18, 2016

Source: IPeC archives

The commercially-available cellulose membrane (Membracel®) was applied to the injury site for the first time, 4 d after the accident (D 21 of captivity – Figure 1C) following asepsis and debriding. The asepsis procedure was repeated each time the membrane was changed, which occurred once every 5 d (D 26 and D 31 d of captivity –

Figures 1D and 1E). From D 19-21, sessions of moxibustion were included as part of the treatment, q 24 h (Figure 2).

The bird was fed with whole sardines (*Sardinops sagax*) and either Organew® (1.25 g/kg) or Aminomix® (2 g) – both twice a week. The bird remained active and fed voluntarily, having preference for the viscera of the fish.



Figure 2 – Session of moxibustion with *Artemisia vulgaris* stick (white arrow) on deep skin injury on anterior limb of a *Catharacta chilensis*
Source: IPeC archives

Treatment with the porous cellulose membrane (Membracel®) and three sessions of moxibustion with herbs (*Artemisia vulgaris*) (SCOGNAMILLO-SZABÓ; BECHARA, 2001) lasted a total of 17 d after the re-injured wound. The progression of healing is displayed in figure 1, showing growth of the tissue beginning at the periphery of the wound and developing clean moist scar tissue. The wound was bandaged for protection (Vetrap®), since the first reinjuring day and changed each time there was a moxibustion session or a membrane application. The bandage was finally removed after 14 d of the re-injured wound, when the skin was already completely healed.

This paper describes the successful use of a commercially-available cellulose membrane (Membracel®) together with moxibustion therapy for the acceleration of the healing process of injured skin in the metacarpus region of a Chilean skua. Considering that these animals are very sensitive to human presence (DURANT et al., 2016a, 2016b), the less time in captivity is the best conduct (HUBER et al., 2017). Another challenge was also the region of the injury with low blood supply (RIGGS; TULLY, 2004), as well as the stress cycle taking more time to heal (DURANT et al., 2016b). Considering 15 d, the overall healing process was a brief period of time. In the natural environment, traumatic injuries in marine birds are reported for a long time and is relatively common. This may be caused by accidents and disorientation during flight or environmental factors, such as high winds, fog and tropical storms (ROTH, 1976).

Moreover, interactions with human activities can also cause serious injuries, such as collisions with boats or fishing gear and iatrogenic factors in captivity involving errors in the physical restraint and handling of birds and/or inadequate lodging (MARK et al., 1988; SERAFINI; LUGARINI, 2014).

A study involving birds with deep wounds in the dorsal region of the head that were submitted to conservative treatment for three weeks found little or no healing. In contrast, healing was fast (14 d) and clean after the use of a skin flap (GENTZ; LINN, 2000). According to Burke et al. (2002), 10-14 d is enough to heal a clean stitched wound, where the edges are approximated. In the present case report, the wound healed and starting feather growth occurring in 14 d without having the edges approximated. This was considered a key factor. The bird was reintroduced into the wild after a total of 64 d of treatment, 17 d of which involved the application of a cellulose membrane and moxibustion and 28 d after the full healing process (June, 20th) for feather growth. The animal demonstrated complete healing of the injury and a clinical condition in line with the protocol for the release of birds within the scope of the Santos Basin Beach Monitoring Program.

In veterinary science, the use of this membrane is common and affordable when assisting the wound healing process in domesticated animals, such as cattle (MARQUES et al., 1996) and pets (IAMAGUTI et al., 2008). Several types of grafts have been used to assist in the treatment of necrotic lesions, injuries and burns since

early 1950. Cannon and Longmire Junior (1952) report the use of homografts of the skin on chickens. Xenografts, like intestinal tissue from a pig on skin defects in birds (HERNANDEZ-DIVERS; HERNANDEZ-DIVERS, 2003) and the use of a flap and graft on pododermatitis lesions in birds of prey (STROUD et al., 2003) have also been reported.

Topical therapy with the application of a cellulose membrane and moxibustion proved to be a novel,

affordable, efficient, and accessible therapeutic modality that can be used in the treatment of skin injuries for marine birds in rehabilitation.

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